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(54) puncture method and puncture system

(57) The present invention relates to a puncture method and a puncture system. More specifically, the objective of the present invention is to carry out the aspiration of a sample from a human organ or an animal organ and the inner examination thereof, without the outward leak of the fluid and the like in the organ.

Using the puncture method and puncture system of the present invention, a parasol part (1) arranged on reservoir (2) is made to adhere through an adhesive to a site to be punctured, a needle body (30) is inserted all through a sealing part (3A) of the reservoir into the site to be punctured to draw out the inner fluid, the leak of the fluid can be prevented by the reverse operation of the sealing part (3A).

FIG. 1

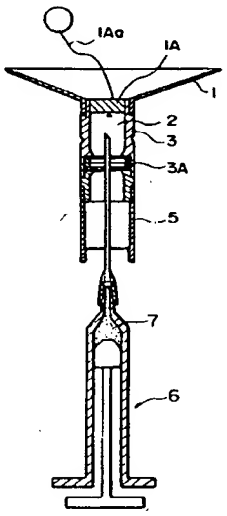
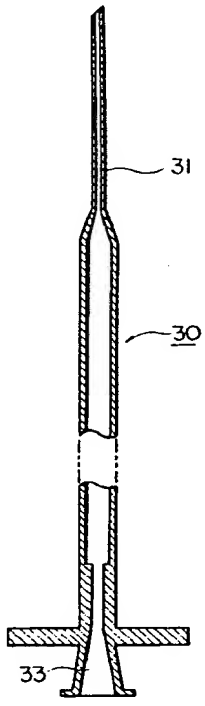


FIG. 7



EP 0 745 350 A1

Description

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to a puncture method and a puncture system. More specifically, the present invention relates to a novel modification thereof to carry out the aspiration of a sample from an organ and the examination of the inner conditions of the organ without the outward leak of the fluid and the like in the organ of human bodies and animals.

Description of the Prior Art

A puncture method generally comprising puncturing a site to be punctured in an organ with an injection needle and aspirating the inner fluid and the like for pathological examination of the fluid and the like, has been employed conventionally.

Because conventional puncture method has been composed as described above, the following problems have been remarked.

When an injection needle is inserted into a site to be punctured to aspirate and then withdraw the fluid and the like, an opening remains at the site punctured with the injection needle so that the fluid and the like may happen to leak into bodies, eventually causing the metastasis of the fluid into other organs if the fluid is malignant.

Overcoming the above problems, the present invention has been achieved. The objective of the present invention resides in providing a puncture method and a puncture system so as to carry out the aspiration of a sample from an organ and the examination of the inner conditions of the organ without leaking out the fluid and the like in the organ of human bodies and animals.

The present invention provides a puncture method and a puncture system as set out in claim 1 or claim 10. Preferred and/or optional features of the invention are set out in claims 2-9 and 11-16.

In the puncture method according to the invention, the parasol part may be located within the peritoneal cavity. Preferably, the parasol member is contained within a second tubular body when inserted through a wall body.

In the puncture system of the invention, the tubular member or body may be mounted on the axial centre of the parasol part. A first tubular body may be provided in series connection with the tubular member.

The tubular member may comprise an elastic support. The needle body may be for insertion into an elastic support.

By the puncture method and the puncture system in accordance with the present invention, when inserting the puncture system through an opening formed on the wall body of a human body or an animal body, preferably to push in only a first tubular body, the parasol part and a reservoir may be sprung out from a second tubular body, whereby the parasol part is opened from the compact shape into the original parasol shape. At the state, there may follow the steps of drying the surface of a site to be punctured by means of a drying means inserted from the other direction and thereafter adhesive may be fed by scission of a bag part, removal of a plug or other adhesive feeding jigs onto the site to be punctured or the parasol part to a final film thickness of about 0.1 to 0.2mm.

At the state described above, pushing inwardly the whole system, the parasol part gets in close contact with the site to be punctured, so that the two are integrated by means of the action of the adhesive.

A needle body may be inserted into the first tubular body then, the needle body punctures the sealing part to pass through the site to be punctured. By drawing out only a bar-like needle part at the state from a tubular needle part and inserting an aspirator into the head of the tubular needle part for aspiration, the fluid and the like in the site to be punctured can be aspirated and drawn out. By cutting the tubular member or body immediately after completion of such aspiration, the parasol part and a part of the tubular member or body can remain on the site to be punctured, along with the compaction of the sealing part to recover the original shape, so that the opening made during puncturing with the needle body therefore disappears and the opening formed on the site to be punctured is completely occluded with the sealing part, whereby the outward leak of the inner fluid can be prevented. Thus, the metastasis of a malignant cancer via such leak to other organs can be prevented.

By inserting a camera or a sample collector instead of the aspirator described above, the inside of the site to be punctured can be observed or a biological sample can be collected.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 depicts the sectional view of the principal part of the puncture system in accordance with the present invention;

Fig. 2 depicts the enlarged sectional view of the sealing part of Fig. 1;

Fig. 3 depicts the sectional view showing another example of Fig. 2;

Fig. 4 depicts the sectional view showing still another example of Fig. 2;

Fig. 5 depicts the structurally decomposed view of the system of Fig. 1, for arranging a first tubular body;

Fig. 6 depicts the structural view showing a second tubular body;

Fig. 7 depicts the sectional view showing the tubular needle part of the needle body;

Fig. 8 depicts the sectional view showing the bar-like needle part;

Fig. 9 depicts the sectional view of the needle body;
Fig. 10 depicts the compositional view showing a puncture method;
Fig. 11 depicts the compositional view showing a puncture method;
Fig. 12 depicts the compositional view showing a puncture method;
Fig. 13 depicts the longitudinal sectional view of the state prior to puncturing;
Fig. 14 depicts the transverse sectional view of Fig. 11:
Fig. 15 depicts the longitudinal sectional view of the state prior to puncturing;
Fig. 16 depicts the transverse sectional view of Fig. 13;
Fig. 17 depicts the longitudinal sectional view of cutting the bag part;
Fig. 18 depicts the transverse sectional view of Fig. 15;
Fig. 19 depicts the longitudinal sectional view of the parasol part in the state in adhesion to the site to be punctured;
Fig. 20 depicts the transverse sectional view of Fig. 17;
Fig. 21 depicts the longitudinal sectional view of the state immediately prior to puncturing;
Fig. 22 depicts the transverse sectional view of Fig. 19;
Fig. 23 depicts the longitudinal sectional view of the puncturing state;
Fig. 24 depicts the transverse sectional view of Fig. 21;
Fig. 25 depicts the longitudinal sectional view of the aspiration state;
Fig. 26 depicts the transverse sectional view of Fig. 23;
Fig. 27 depicts the longitudinal sectional view of the state after aspiration when the needle body is removed;
Fig. 28 depicts the sectional view prior to cutting the elastic support;
Fig. 29 depicts the transverse sectional view of the cutting state of Fig. 26;
Fig. 30 depicts the longitudinal sectional view after the puncture system is removed;
Fig. 31 depicts the transverse sectional view of Fig. 28;
Fig. 32 depicts the transverse sectional view of an embodiment using a camera; and
Fig. 33 depicts the transverse sectional view of an embodiment using a sample collector.
Fig. 34 depicts the structural view showing another embodiment;
Fig. 35 depicts the sectional view showing still another embodiment;
Fig. 36 depicts the sectional view showing further embodiment;
Fig. 37 depicts the sectional view showing still further embodiment;
Fig. 38 depicts the sectional view showing a surgery condition;

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

The puncture method and puncture system of the present invention will now be explained in details hereinbelow with reference to drawings by way of example only. Firstly, a first embodiment will be described.

Fig. 1 shows the principal part of the puncture system; "1" represents a parasol part in a parasol shape composed of urethane rubber; tubular member 3 containing adhesive reservoir 2 is integrally formed (may be also formed separately) at the position of the axial center of the parasol part 1; and the reservoir 2 is composed of stopper 1A and sealing part 3A, arranged in a sealing fashion on the tubular member 3 Herein, the tubular member 3, the parasol part 1 and the sealing part 3A may be integrally molded, or they may be composed of separate parts and then integrally connected together. The stopper 1A is composed of rubber and the like, arranged in a removable manner on the tubular member 3. By pulling wire 1Aa connected with the stopper 1A, the stopper 1A can be removed from the tubular member 3. As shown in Fig. 2, the sealing part 3A is composed of first and third films 3Aa and 3Ac arranged at the both ends in the axial direction and second film 3Ab positioned intermediately between them, and cross-cut 3B is formed on the second film 3Ab so that the needle and the like described below might readily pass through the sealing part 3A. Furthermore, the structure of the sealing part 3A comprises not only such three layers but also a single layer or two layers. Further, there may be provided the sealing part 3A as shown in Figs. 3 and 4.

On the tubular member 3, there is arranged screw body 5 of a tubular form comprising corrosion-resistant aluminium and the like. Adhesive 7 such as surgical Allon-alfa and the like (other adhesives may be used as well) is injected into the reservoir 2 by means of injector 6, immediately prior to use. Without using the injector 6, adhesive 7 may be fed into the reservoir 2 after removing the stopper 1A. Incidentally, it is preferable to set an amount of this adhesive to 0.1cc through 2.0cc.

First tubular body 9 of nearly the same outer diameter as that of the screw body 5, comprising corrosion-resistant aluminium and the like and having also first holder 8, is helically connected in series connection with the screw body 5. Furthermore, the first tubular body 9 may be directly or indirectly connected with the tubular member 3, integrally or in a separate fashion.

As shown in Fig. 6, the first tubular body 9 connected with the elastic support 5 has second holder 10, and is inserted along the coaxial direction into second tubular body 11 comprising corrosion-resistant aluminium and the like. Thus, the puncture system 20 in accordance with the present invention is depicted in the state of completion in Fig. 6. At the state, the parasol

part 1 modified in a more compact shape than the original shape is contained in the second tubular body 11. As shown in Fig. 1, the parasol body 1 is composed of urethane rubber and the like; and the tubular member 3 is composed of silicone rubber, a resin and the like.

Figs. 7 to 9 depict the structure of needle body 30 to be used in the puncture system 20 shown in Fig. 6 described above; Fig. 7 depicts tubular needle part 31; Fig. 8 depicts bar-like needle part 32 to be inserted into the tubular needle part 31. Taper-like insertion part 33 is formed on the rear end of the tubular needle part 31, and by inserting the bar-like needle part 32 through the insertion part 33 into the tubular needle part 31, guide hole 30a inside the tubular needle part 31 is occluded. By forming diameter D1 of expanded part 32a formed on the rear part of the bar-like needle part 32 far larger than the bore diameter of the insertion part 33, the insertion part 33 can be occluded structurally by means of the expanded part 32a. Furthermore, the needle body 30 is entirely coated with silicone coating.

Description will follow about the case of practically puncturing a human organ or an animal organ by means of the structure described above. In the present example, explanation will be made of the case wherein human ovarian cancer is selected as a site to be punctured.

As shown in Figs. 10 to 14, laparascope 41 is inserted into the wall body 40 for expansion under gas supply, to stand up tubular first trocar 42. As shown in Figs. 13 and 14, inserting the puncture system 20 of the present invention through the first trocar 42 into the wall body 40 to push in only first tubular body 9 as shown in Fig. 15, parasol part 1 is pushed outside from the inside of second tubular body 11. Then, the parasol part 1 is opened from the compact shape into the original parasol shape.

As shown in Fig. 16, using drying means 44 for supplying dry air or gas through second trocar 43 inserted into the wall body 40 from the other direction, the surface of an ovarian cancer site to be punctured 45, for example, is dried. Subsequently, drawing out the drying means 44 from the second trocar 43, inserting hooking means 46 instead into the wall body 40 for pulling wire 1Aa as shown in Figs. 17 and 18, stopper 1A is removed to supply adhesive 7 onto the site to be punctured 45. Additionally, the adhesive 7 should be injected primarily into reservoir 2, immediately prior to surgery.

As shown in Figs. 19 and 20, pushing the puncture system 20 into the wall body 40, the parasol part 1 is fixed through the adhesive 7 onto the surface 45a of the site to be punctured 45. As shown in Figs. 21 and 22, needle body 30 is inserted into the puncture system 20 at that state. As shown in Figs. 23 and 24, then, the needle body 30 is passed through sealing part 3A, so that the tip of the needle body 30 be inserted into the site to be punctured 45.

Drawing only the bar-like part 32 from the tubular needle part 31 at such state, inserting aspirator 50 into insertion part 33 of the tubular needle part 31 for carrying out aspiration, as shown in Figs. 25 and 26, the fluid and the like in the site to be punctured 45 are aspirated into the aspirator 50, whereby sampling is completed.

After completion of the aspiration, drawing out the tubular needle part 31, inserting cutting means 46A composed of a scissor into the wall body 40, as shown in Figs. 27 and 29, to cut recessed groove part 3c of the tubular member 3 in the state fixed to the site to be punctured 45, only a part of the tubular member 3 and the parasol part 1 are left in the state fixed to the site to be punctured 45. In such case, the shape of the site to be punctured 45 is in the compact shape compared with the original shape. Furthermore, because the opening left on the sealing part 3A after drawing out the needle body 30 is occluded by means of the shrinking action of the elastic body, the leak of the fluid and the like in the site to be punctured 45 to the outside (namely, endoabdominal region) can be prevented.

Then, it should be determined whether or not the fluid and the like in the site to be punctured 45 is malignant and which operative technique should be adopted. When it is diagnosed that the sample is benign, the site to be punctured 45 should be resected. Concurrently with the resection of the site 45, the remaining parasol part 1 and the like should be removed from bodies, as shown in Figs 30 and 31. When the fluid and the like are malignant, alternatively, the site to be punctured 45 is resected at the state while being enclosed by a bag not shown, to prevent the spread of the fluid and the like into the endoabdominal region. Thus, the metastasis of a malignant cancer, if any, to other organs can be prevented. Furthermore, coating the tip of the needle body 30 with silicone coating so as to avoid the adhesion of an adhesive, the needle body 30 is advantageously passed through the sealing part 3A.

In another example, inserting camera 60 instead of the aspirator 50 into the site to be punctured 45, as shown in Fig. 32, the inside can be examined by means of monitor TV 61 for establishing the diagnosis.

As shown in Fig. 33, furthermore, inserting well known sample collector 70 instead of the camera 60 and controlling the sample collector 70 by means of remote controller 71, a biological specimen may be drawn out from the site to be punctured 45.

The above example describes the surgery of human bodies. It is needless to say that the above example may be applied also to animals, with no specific limitation to humans. The above example describes the surgery by means of laparascope 41. If such laparascope 41 is not used, however, the system does not require the second tubular body 11 but requires the tubular member 3 and the first tubular body 9, as shown in Fig. 5. Incidentally, the present invention is not limited to the foregoing embodiment, but may be applicable to the following embodiments.

Then, instead of the reservoir 2 employing the plug 1A in the above-mentioned first embodiment, as shown in Fig. 34 illustrating a second embodiment, an adhesive feeding jig 100 containing the adhesive may be

inserted into the peritoneal cavity to feed the adhesive 7 without use of those reservoir 2 and the plug 1A. Further, in a third embodiment illustrated in Fig. 35, a tubular body 4 made of corrosion-resisting aluminum or the like is fitted to an outer periphery of the elastic holder body 3, so that a pressure is applied to the elastic holder body 3 from its outer peripheral side by the tubular body 4 to squeeze and shrink a port 3a formed after the puncture by the needle body or the like for restoration to its original state. A tubular threaded body 5 made of corrosion-resisting aluminum or the like is disposed at the lower end of the elastic holder body. Incidentally, the adhesive such as surgical Allon-alfa and so on is injected into the bag part 2, which may be substituted for the reservoir 2 provided in the parasol part 1, by an injection appliance 6 immediately prior to usage. Accordingly, the bag part 2 is constructed as shown in Fig. 36 and 37. For the practical surgery, as shown in Fig. 38, the bag part 2 is broken within the peritoneal cavity by using cutting mean 43, 46 to feed the adhesive 7 for bonding the parasol part 1 to the site to be punctured, so that the procedure similar to that of the first embodiment can be attained.

Because the puncture method and puncture system in accordance with the present invention are composed as described above, the following advantages may be brought about.

Because a parasol part adheres through an adhesive to a site to be punctured and a needle body is then inserted through the sealing part, the opening of the sealing part is shrunk and occluded after drawing out the needle body, to prevent the outward leak of the fluid and the like in the site to be punctured.

The insertion of a camera and a sample collector can be done through the needle body, whereby a wide variety of the applications can be achieved in medical fields.

Claims

1. A puncture method comprising steps of:

   transferring a parasol part composed of a flexible material onto a site to be punctured;
   supplying an adhesive inside to the site to be punctured or onto the parasol part for adhesion of the parasol part to the site to be punctured; and
   inserting a needle body through a sealing part of a tubular member coupled to the parasol part into the site to be punctured to withdraw outside the fluid within the site to be punctured.

2. A puncture method according to claim 1, comprising inserting a second tubular body through a wall body positioned in front of the site to be punctured while the parasol part is kept in a compact shape modified through the second tubular body from the original shape.

3. A puncture method according to claim 1 or 2, comprising aspirating the fluid in the site to be punctured through the needle body.

4. A puncture method according to claim 1 or 2, comprising inserting a camera through the needle body for the observation of the inside of the site to be punctured.

5. A puncture method according to claim 1 or 2, comprising

   inserting a sample collector through the needle body to collect a part of the inside of the site to be punctured from the sample collector.

6. A puncture method according to any one of claims 1 to 5, wherein the tubular member should be left, after cutting, on the site to be punctured.

7. A puncture method according to any one of claims 1 to 6, wherein the adhesive is provided within a bag part arranged in the parasol part, so that the adhesive can be fed by scission of the bag part.

8. A puncture method according to any one of claims 1 to 6, wherein the adhesive is fed from an adhesive feeding jig containing the adhesive and arranged separately from the parasol part.

9. A puncture method according to any one of claims 1 to 6, wherein the adhesive is provided within the tubular member, so that the adhesive can be fed by removing a plug from the tubular member.

10. A puncture system comprising a tubular member arranged on a parasol part composed of a flexible material and a sealing part arranged in the tubular number.

11. A puncture system according to claim 10, wherein the parasol part is provided with a bag part containing an adhesive therein.

12. A puncture system according to claim 10 or 11, wherein the tubular member is provided with a reservoir having a plug, and the adhesive is contained within the reservoir.

13. A puncture system according to any one of claims 10 to 12, wherein the tubular member can be readily cut structurally.

14. A puncture system according to any one of claims 10 to 13, wherein the sealing part comprises a pair of sealing plates between which ethyl alcohol is held.

15. A puncture system according to any one of claims

10 to 14, comprising a needle body the needle body being coated by silicone coating, and also comprising a tubular needle part and a bar-like needle part inserted along the coaxial direction into the tubular needle part.

16. A puncture system according to claims 12, wherein the stopper has a wire.

FIG. 1

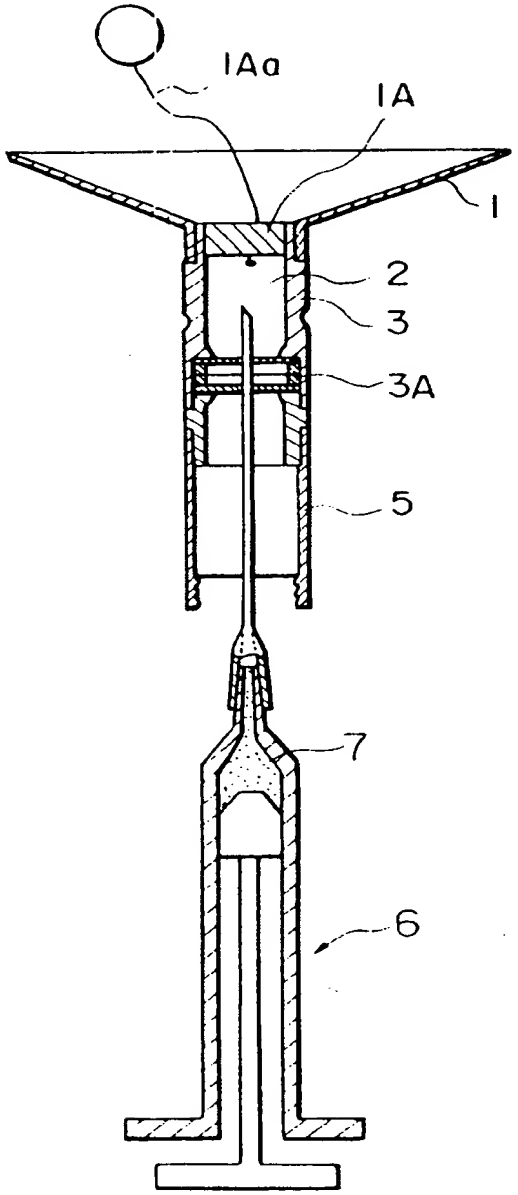


FIG. 2

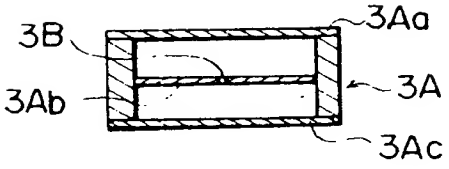


FIG. 3

FIG. 4

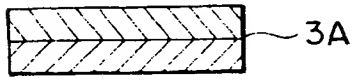


FIG. 5

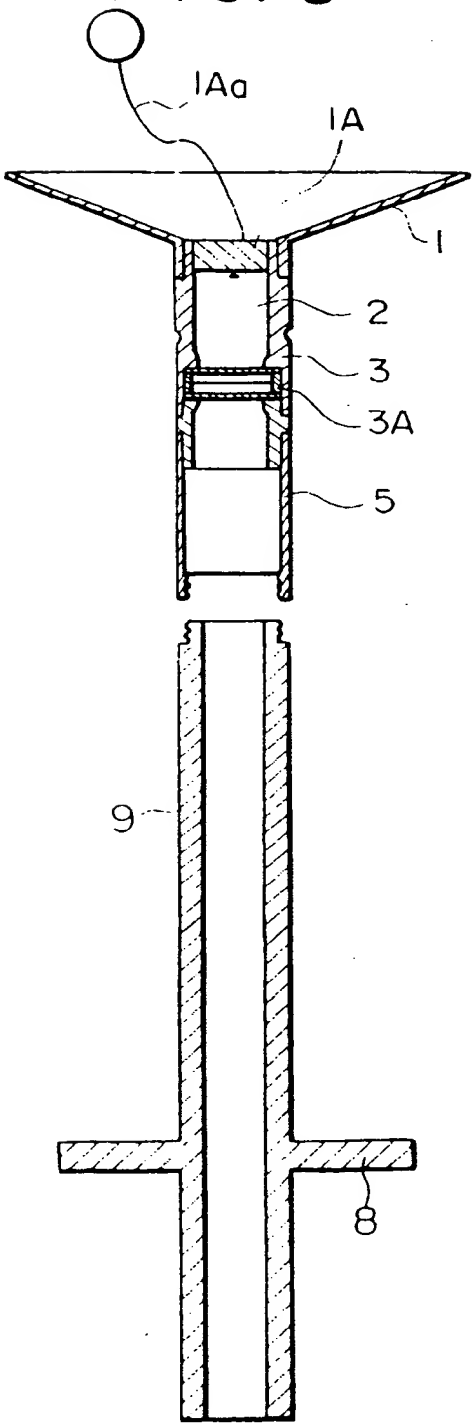


FIG. 6

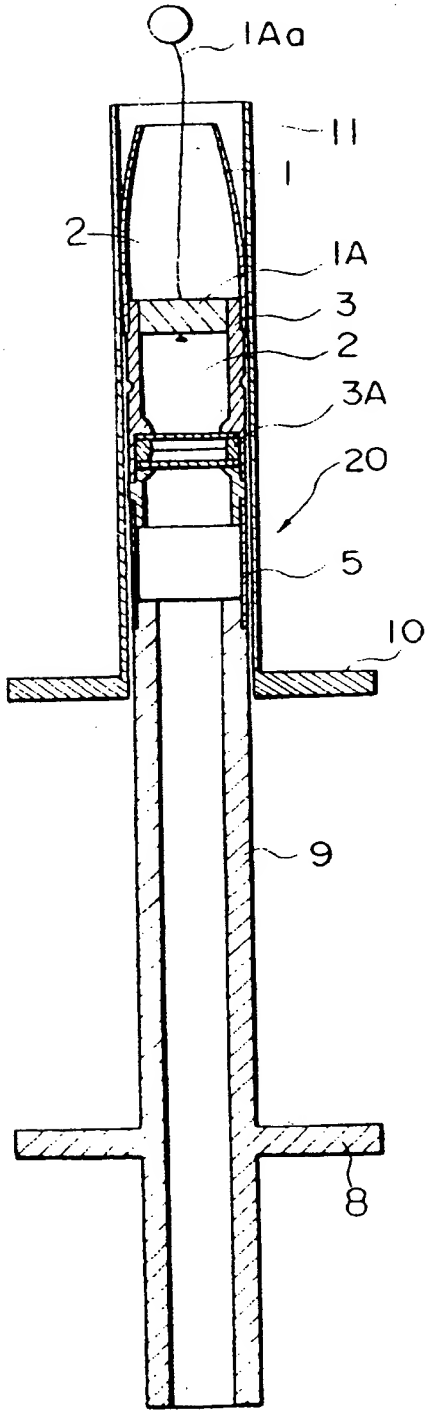


FIG. 7

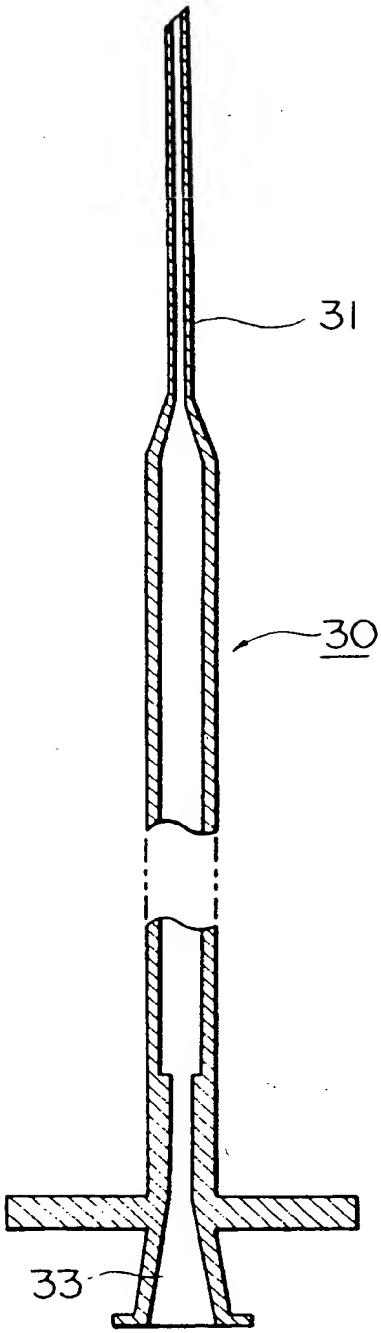


FIG. 8

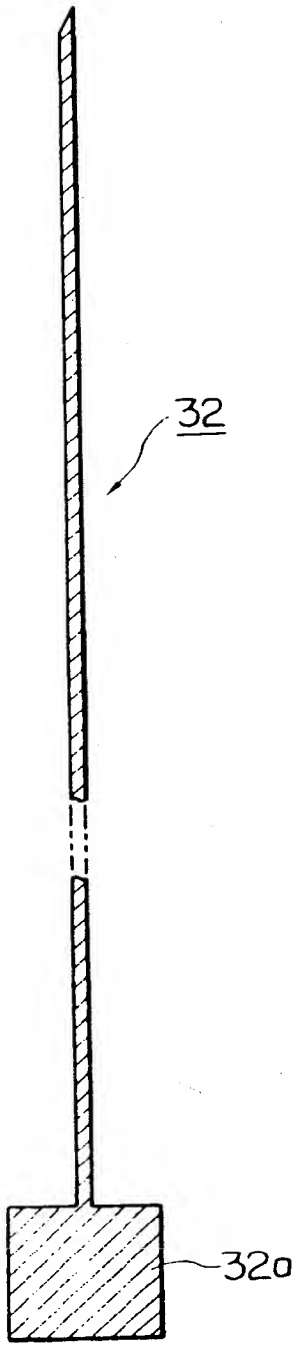


FIG. 9

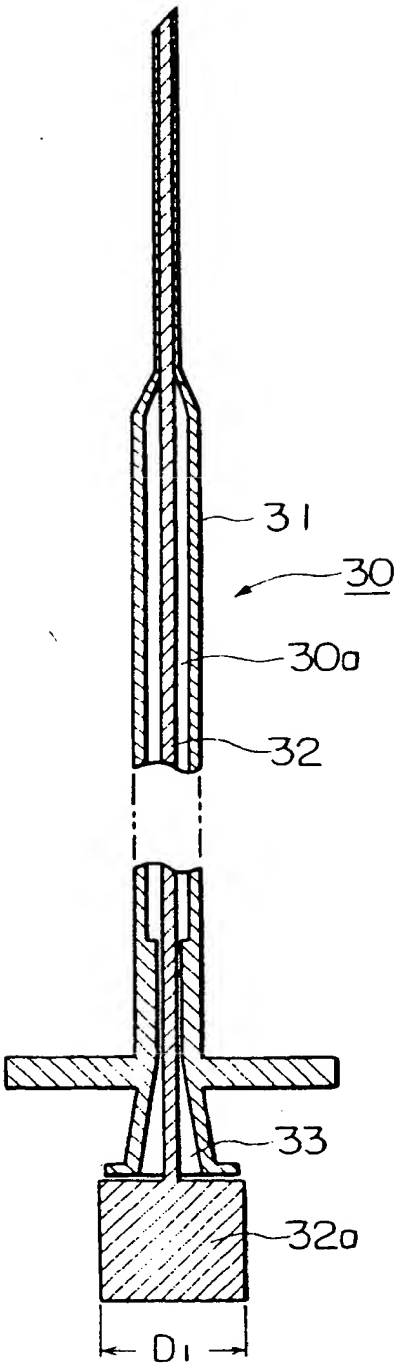


FIG. 10

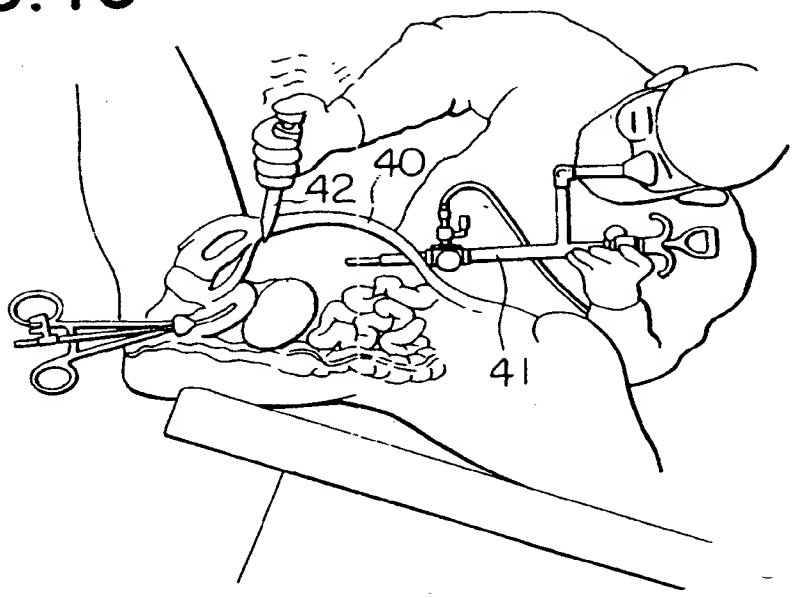


FIG. 11

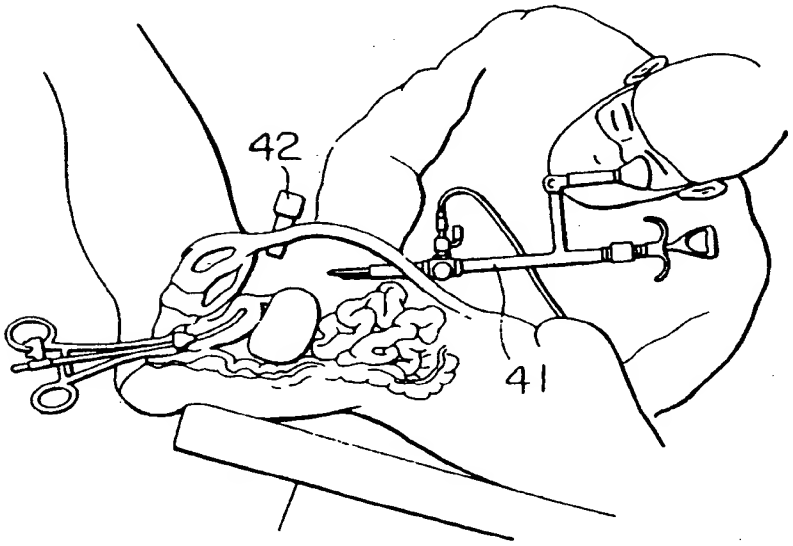


FIG. 12

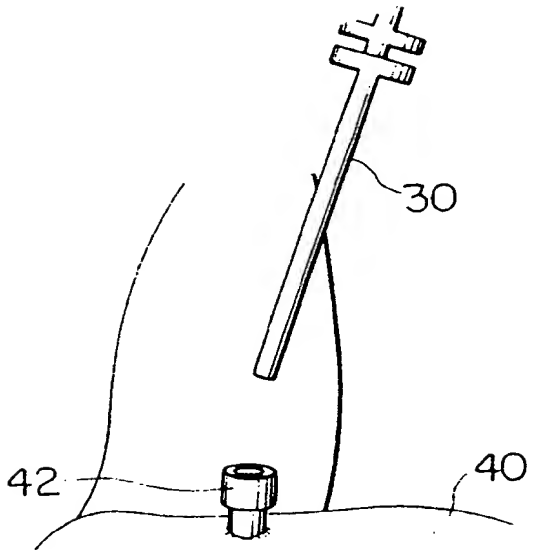


FIG. 13

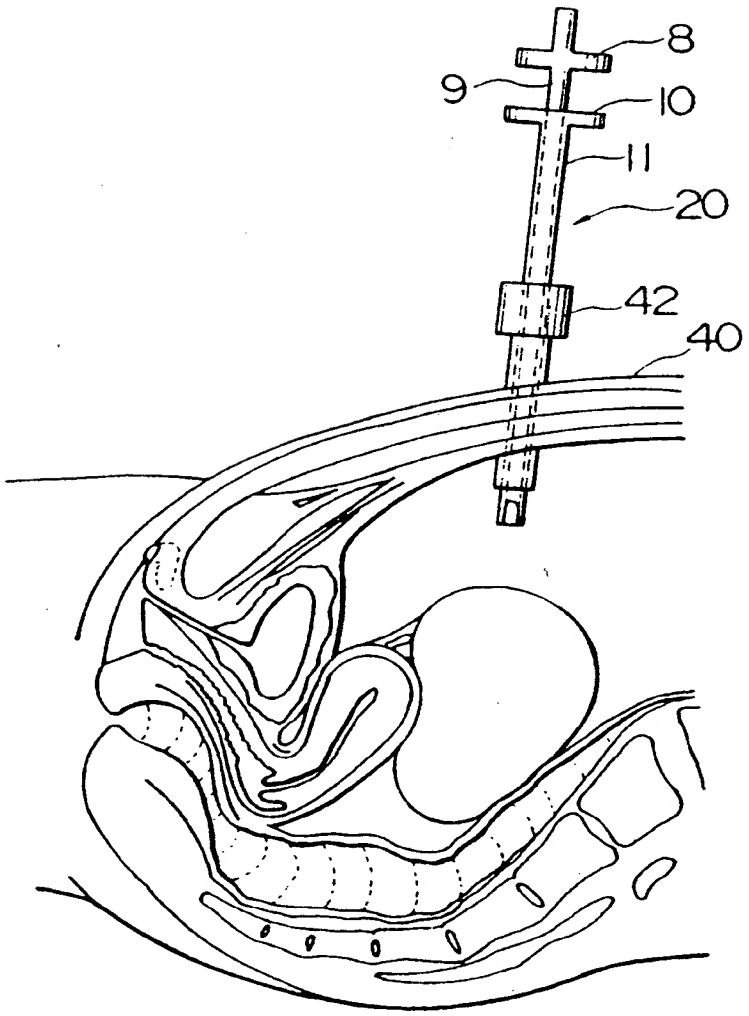


FIG. 14

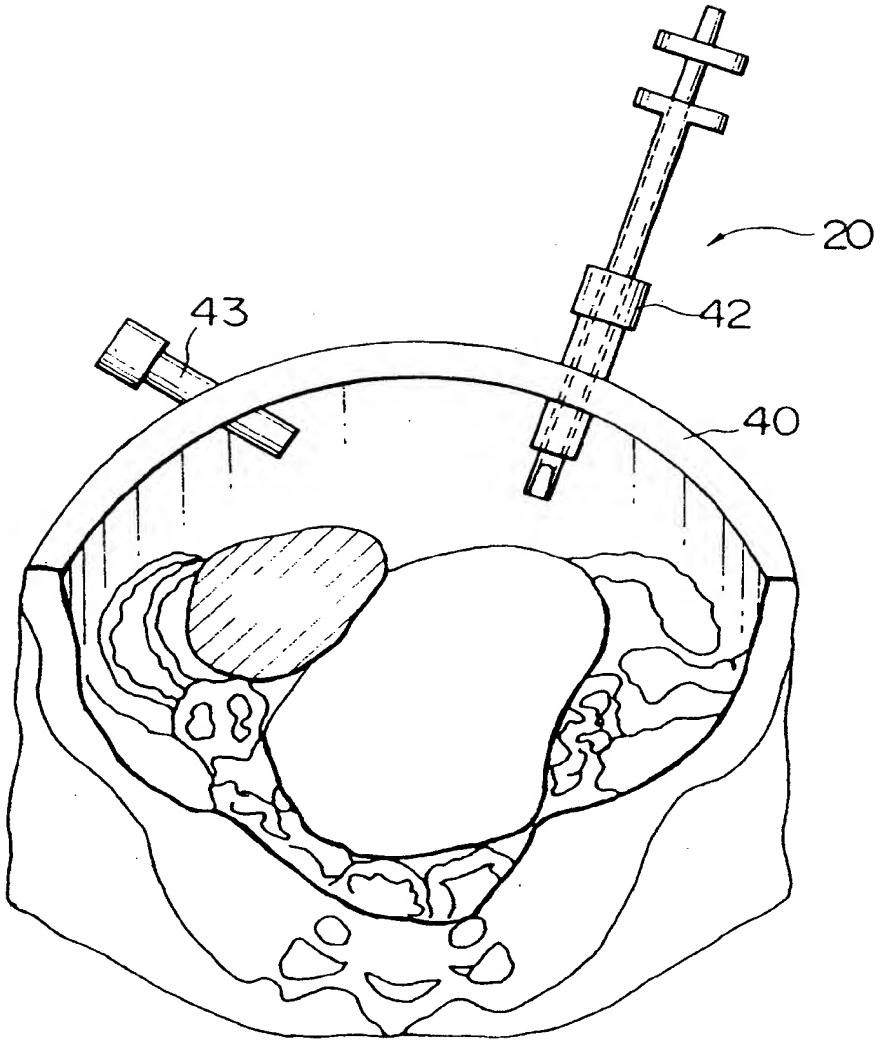


FIG. 15

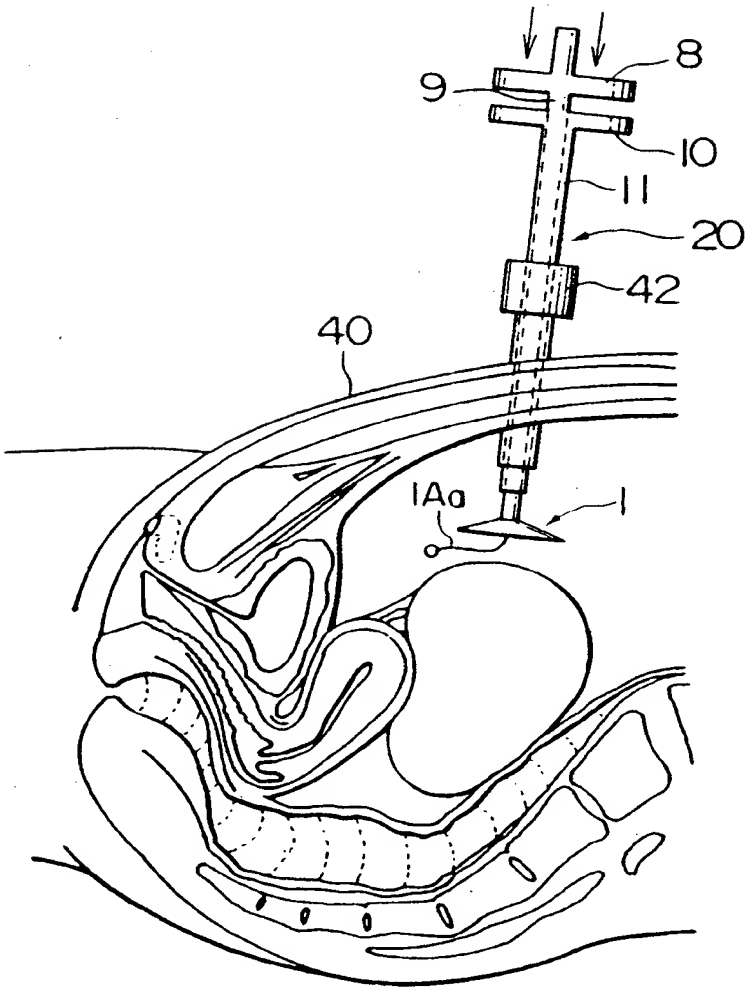


FIG. 16

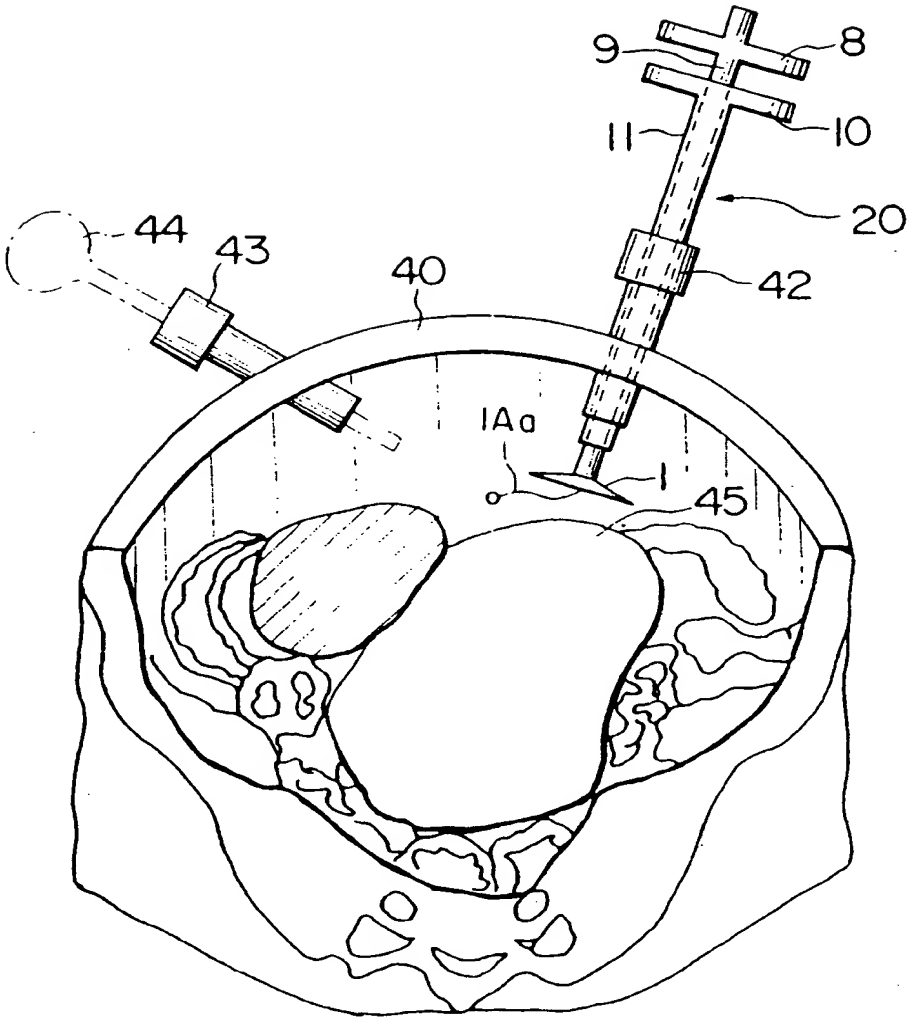


FIG. 17

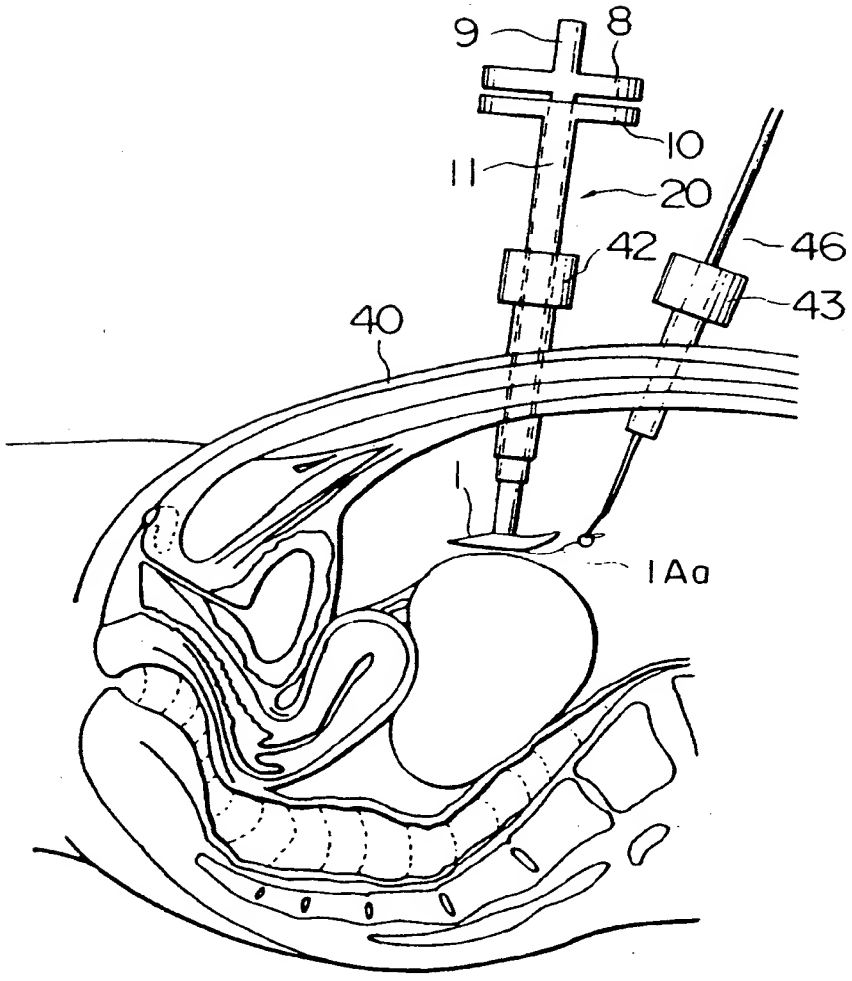


FIG. 18

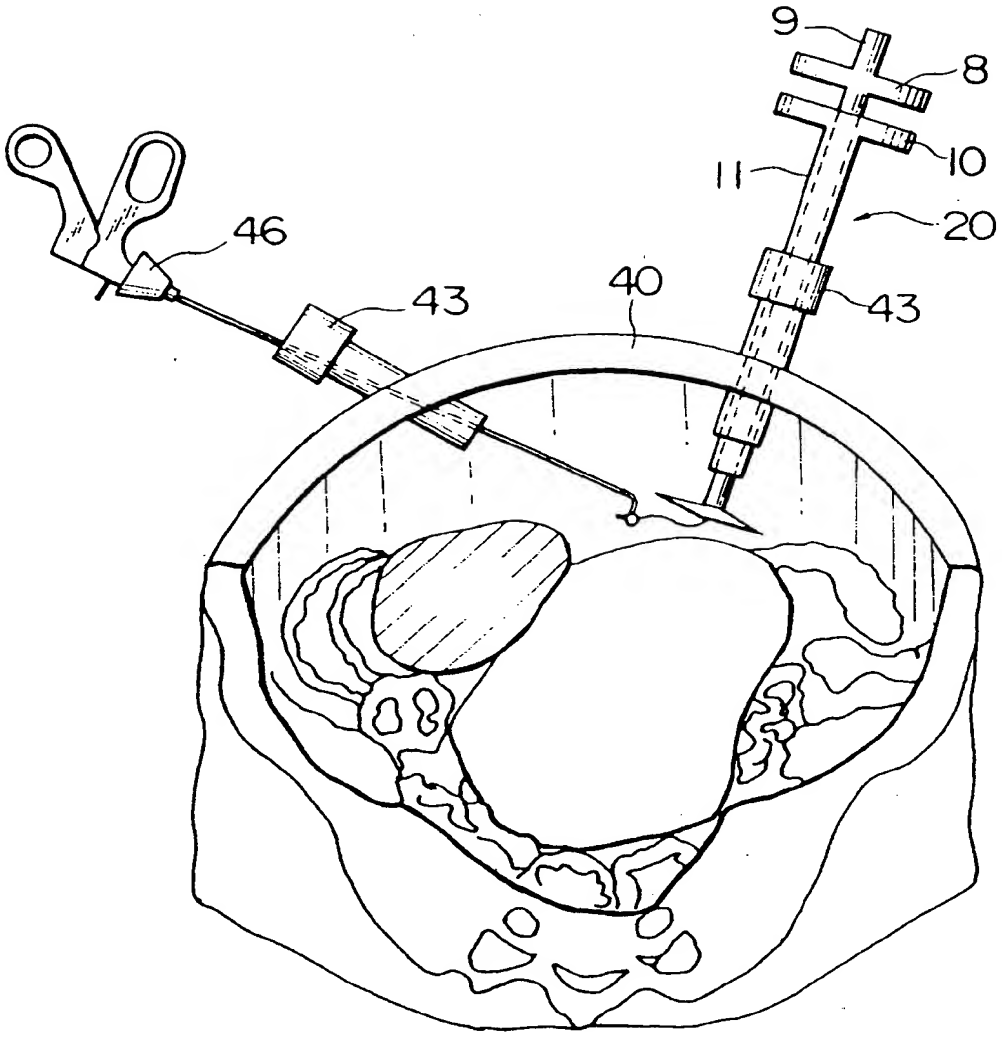


FIG. 19

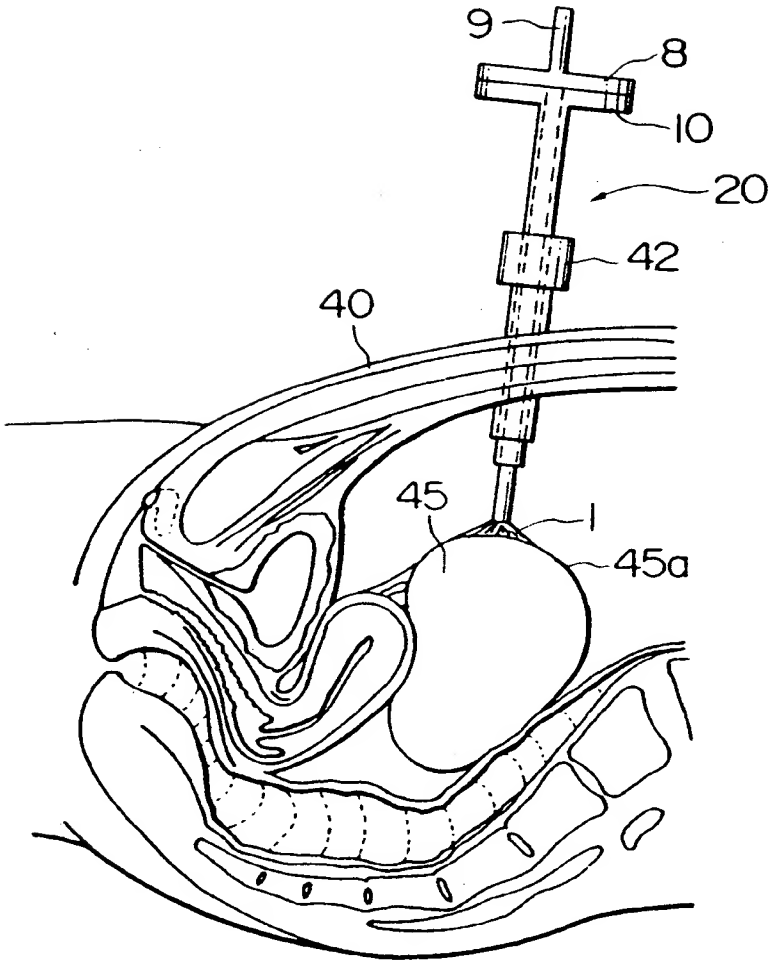


FIG. 20

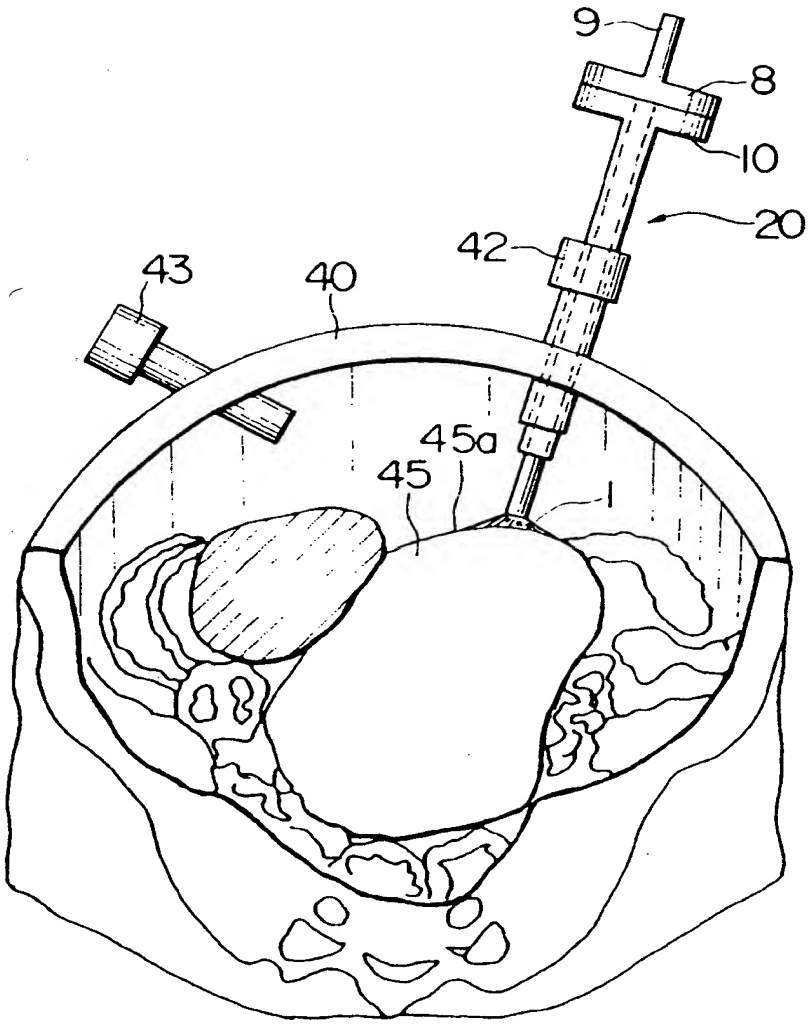


FIG. 21

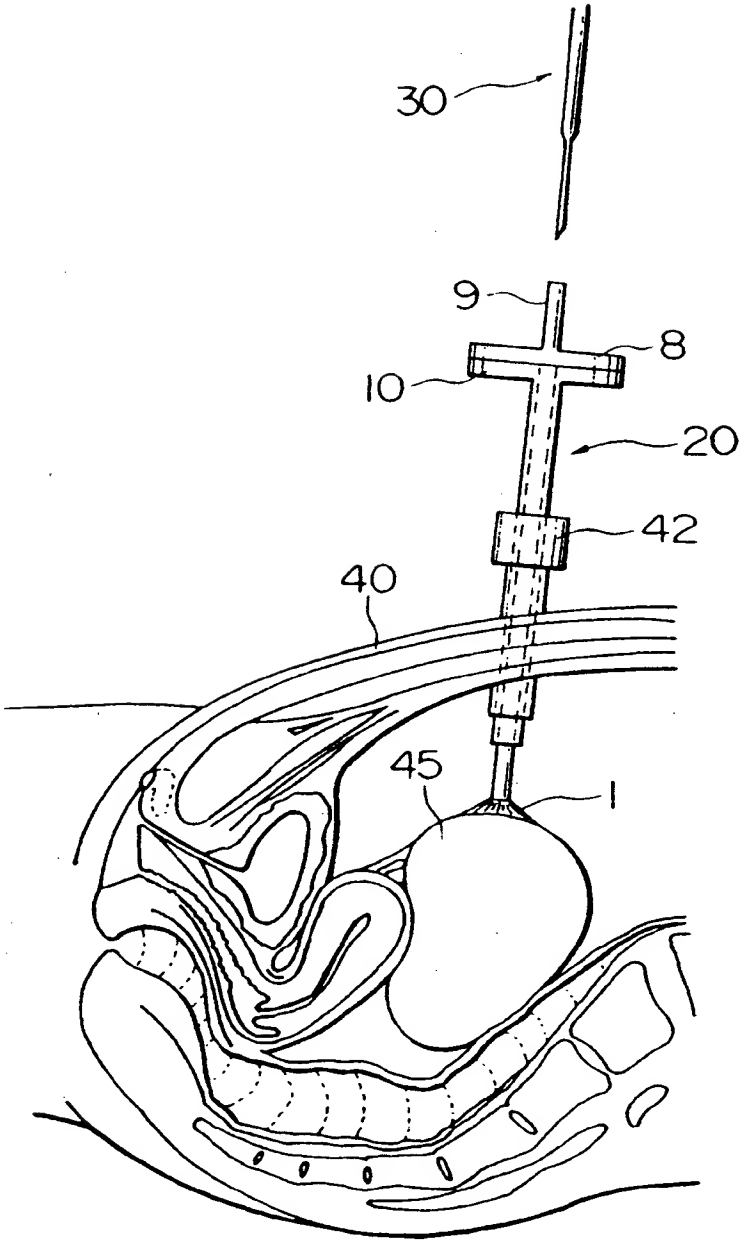


FIG. 22

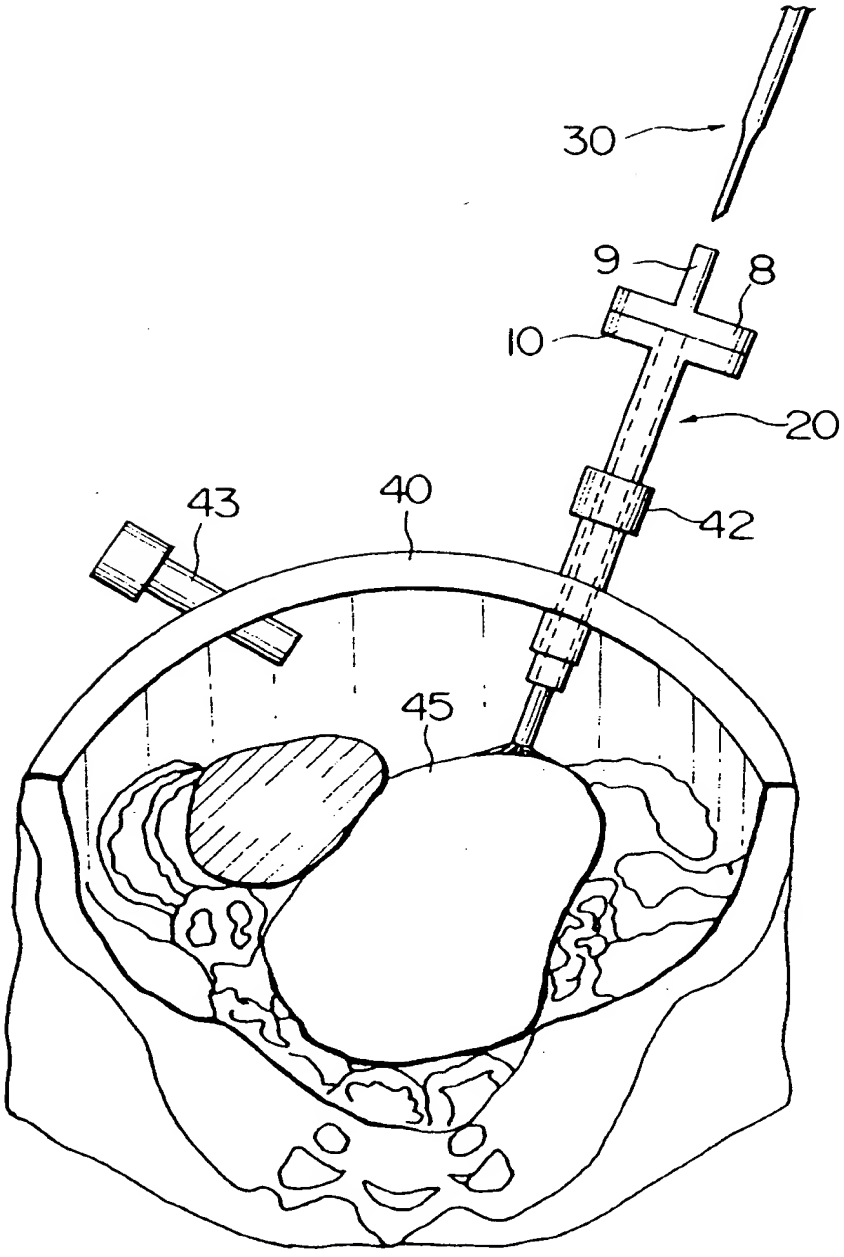


FIG. 23

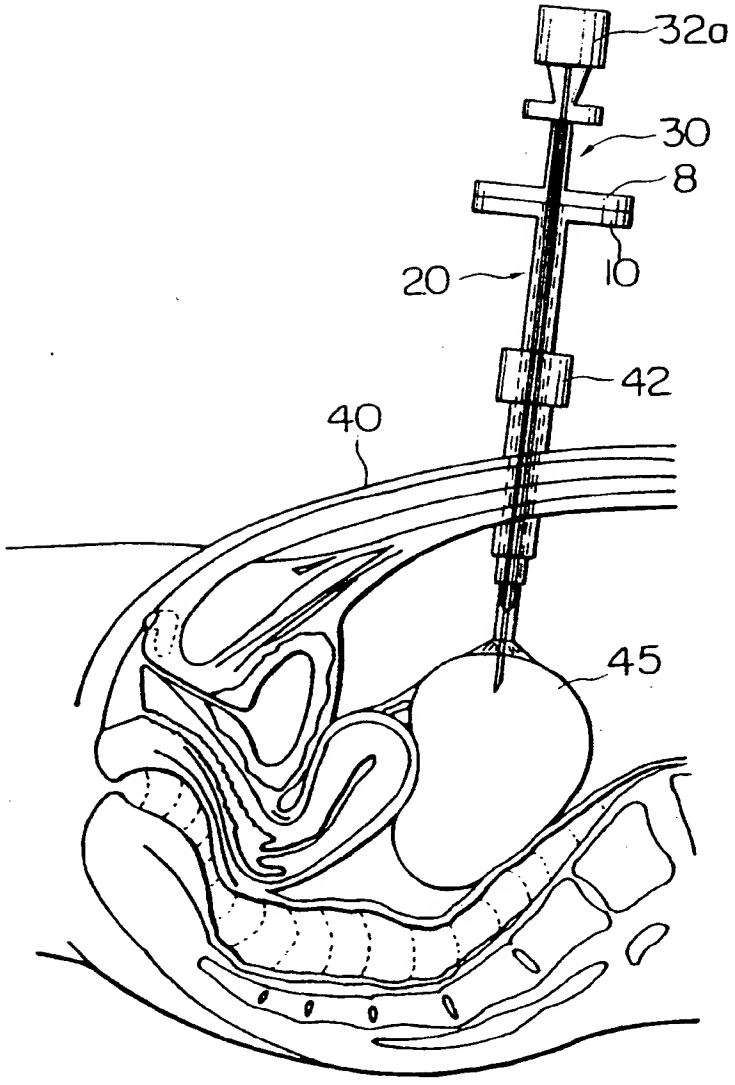


FIG. 24

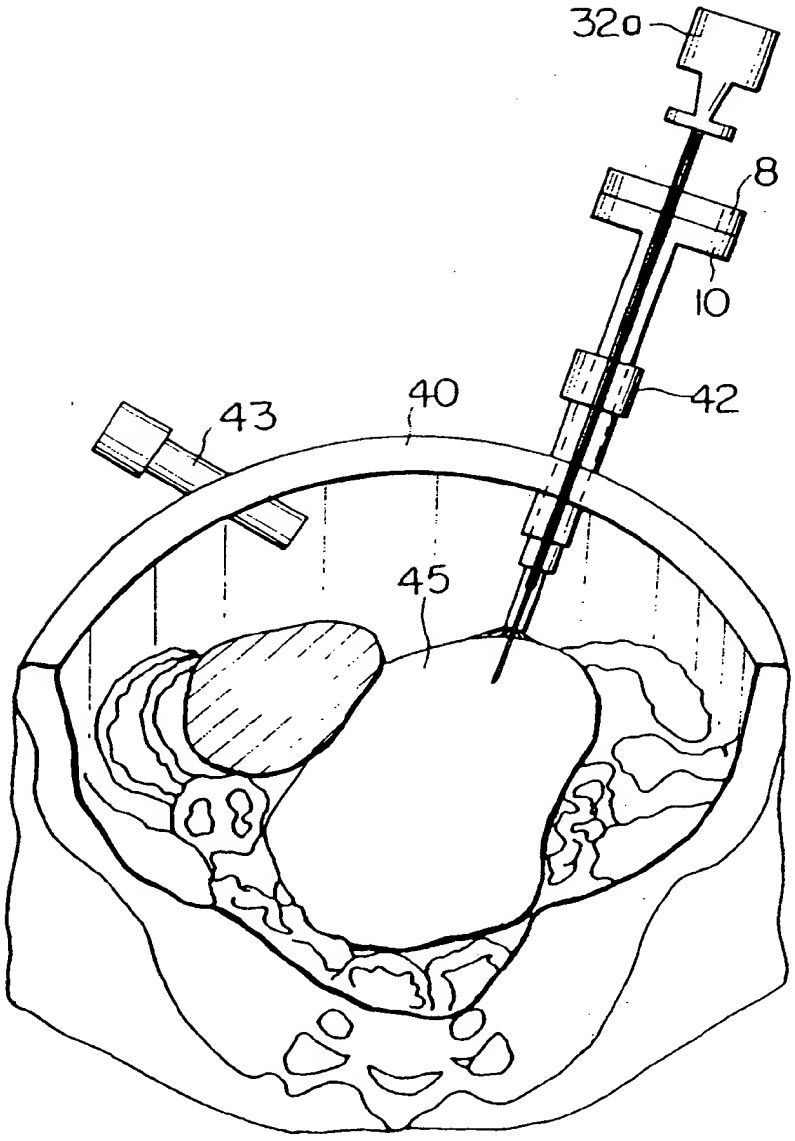


FIG. 25

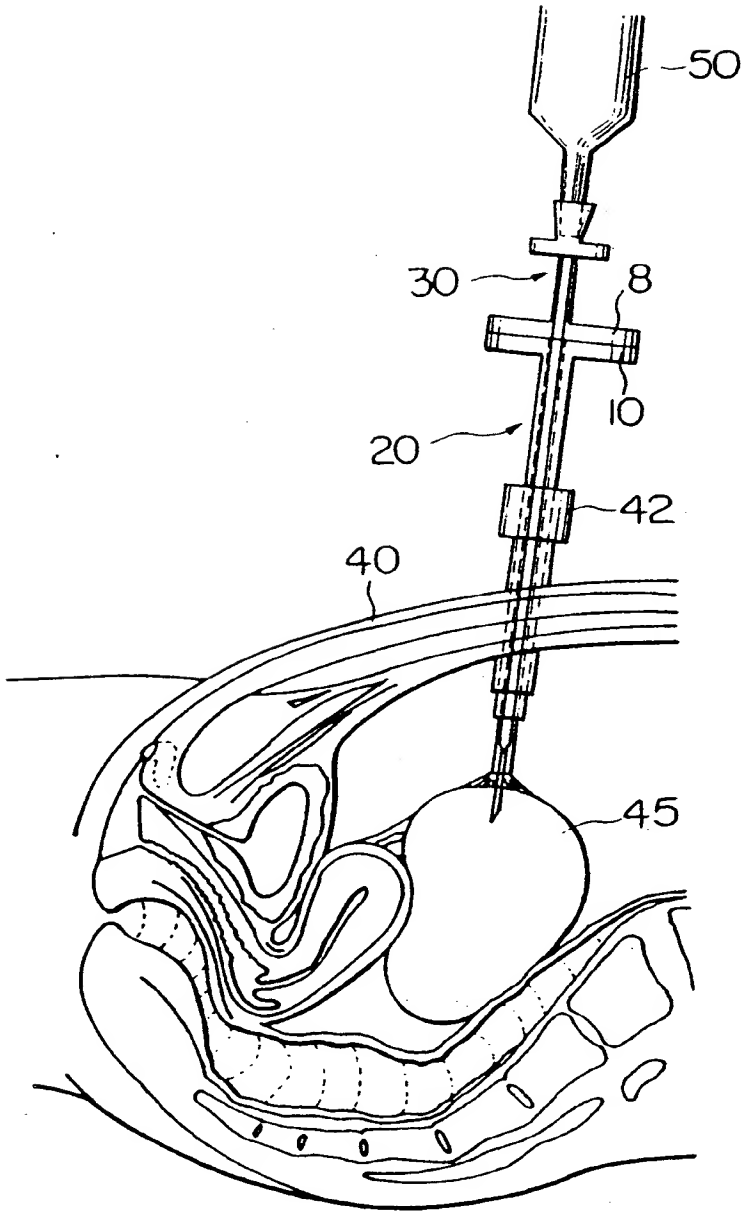


FIG. 26

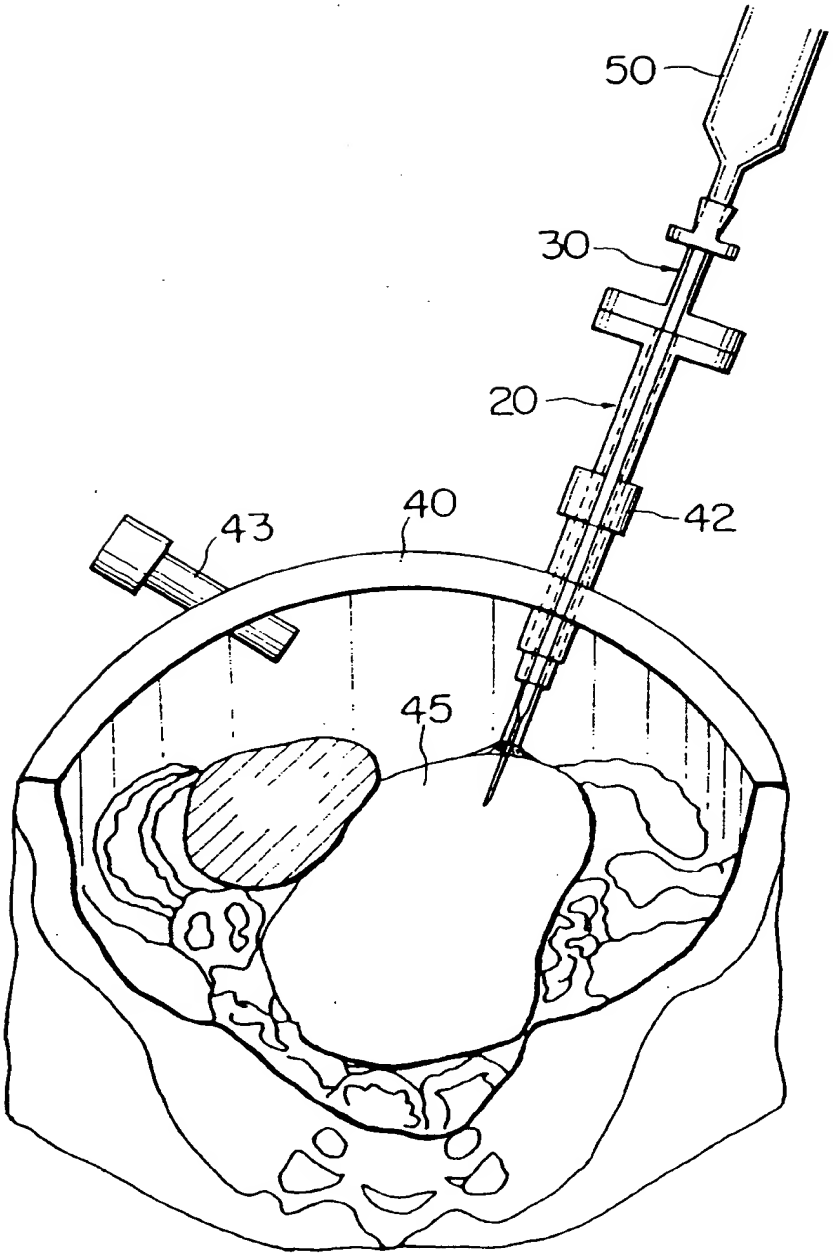


FIG. 27

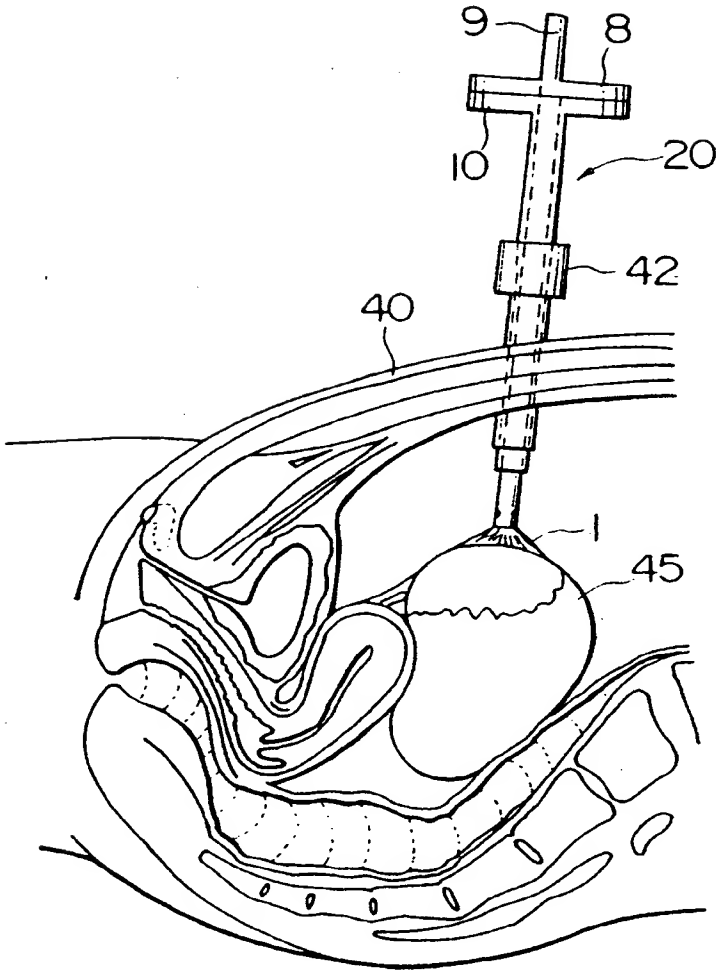


FIG. 28

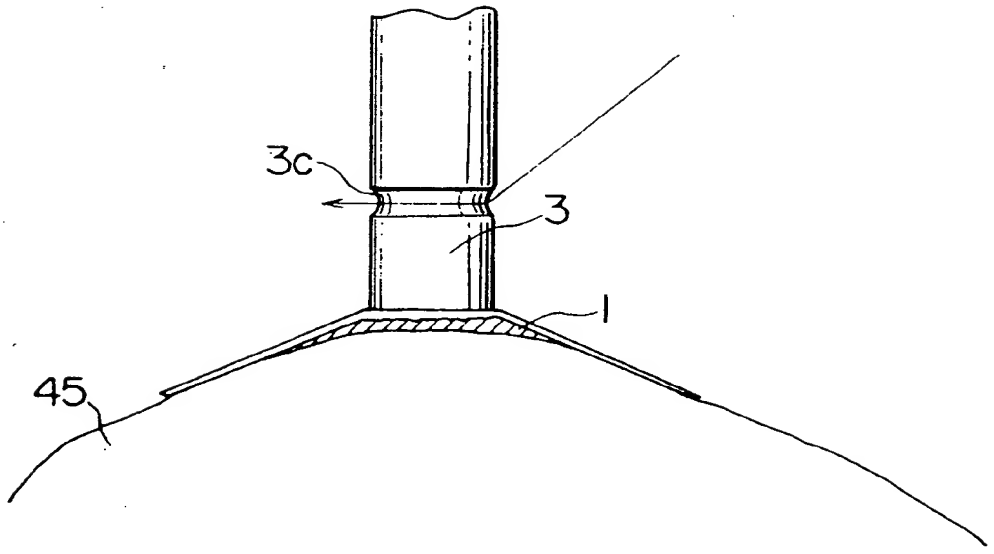


FIG. 29

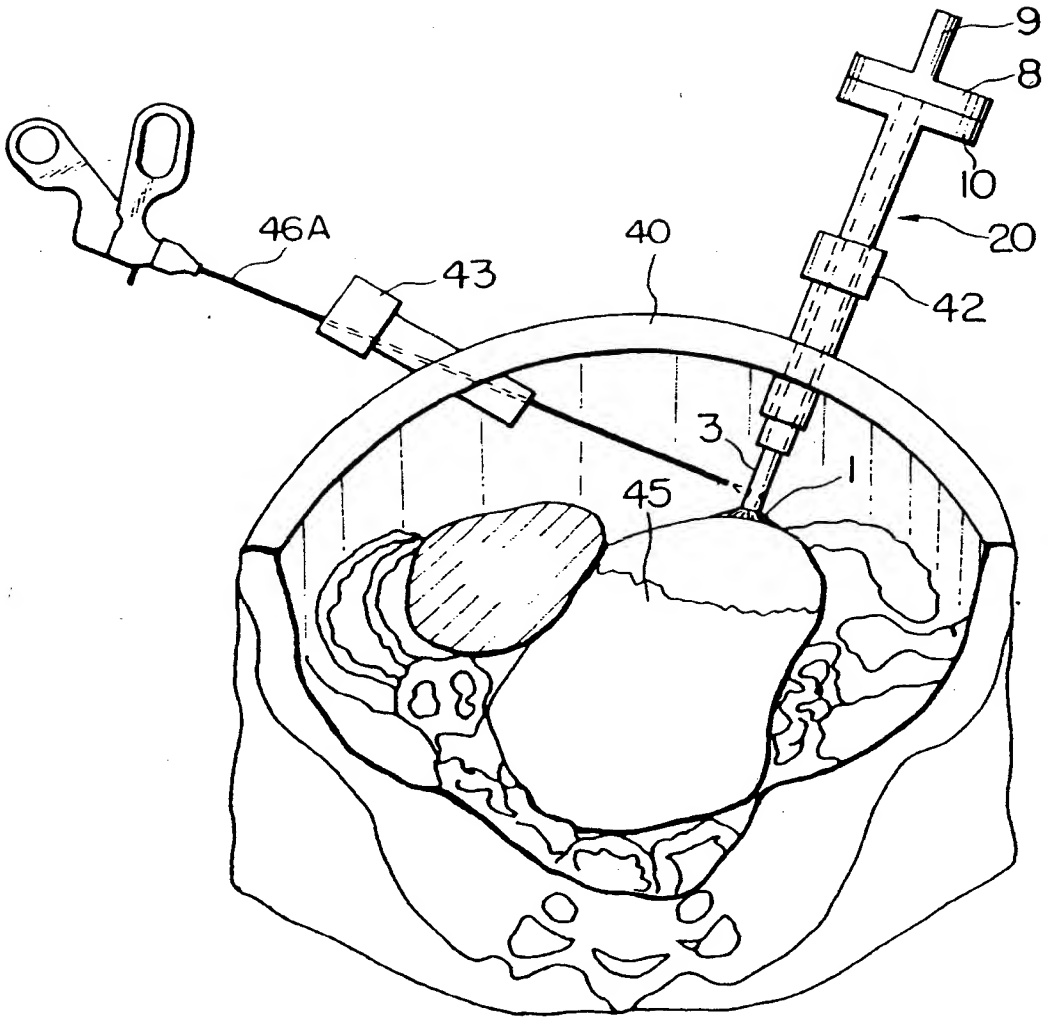


FIG. 30

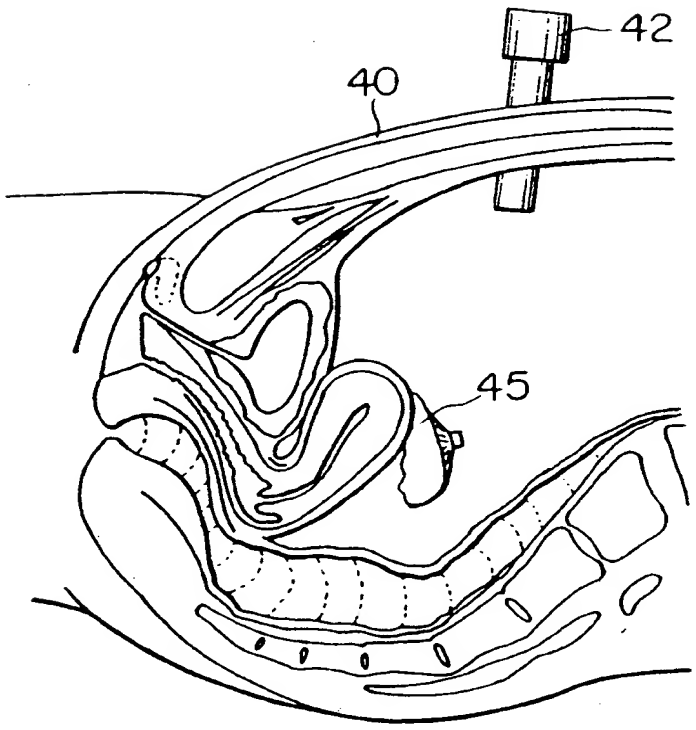


FIG. 31

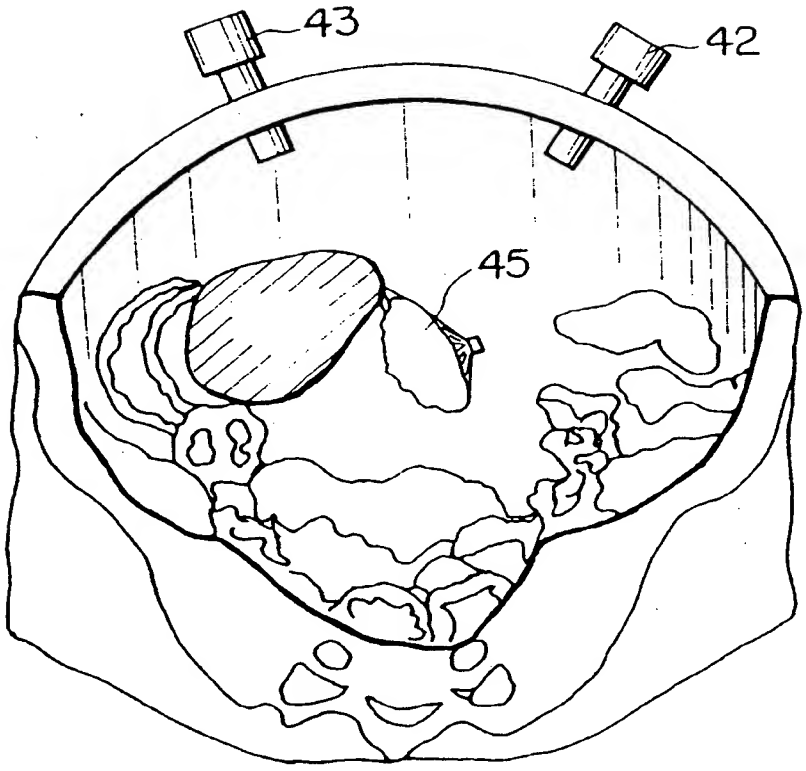


FIG. 32

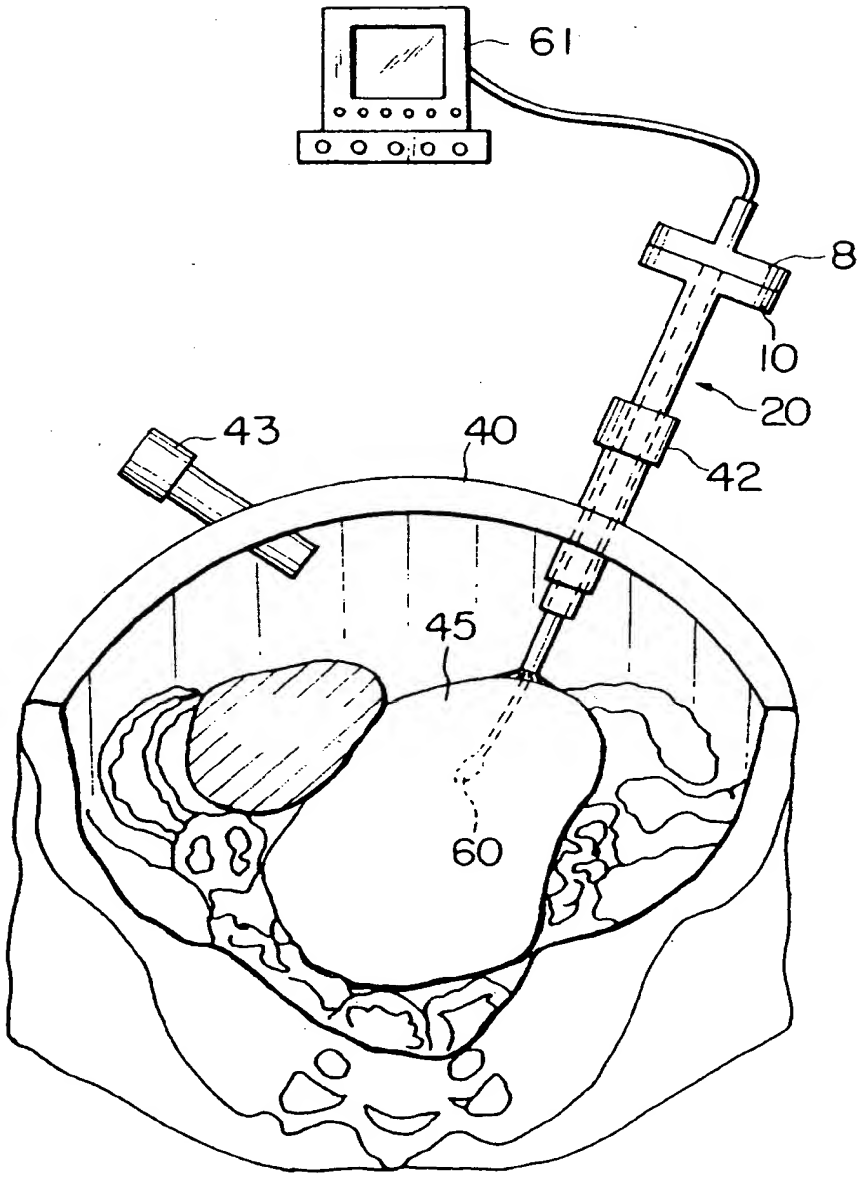


FIG. 33

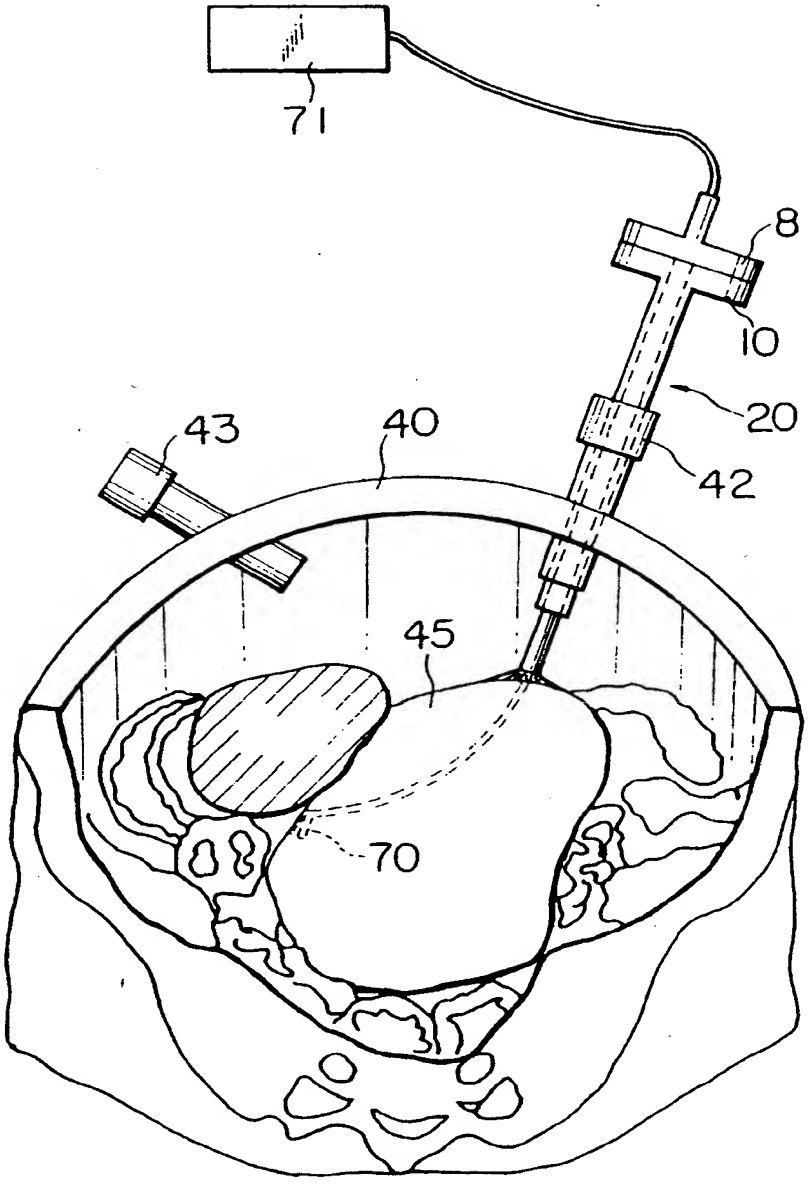


FIG. 34

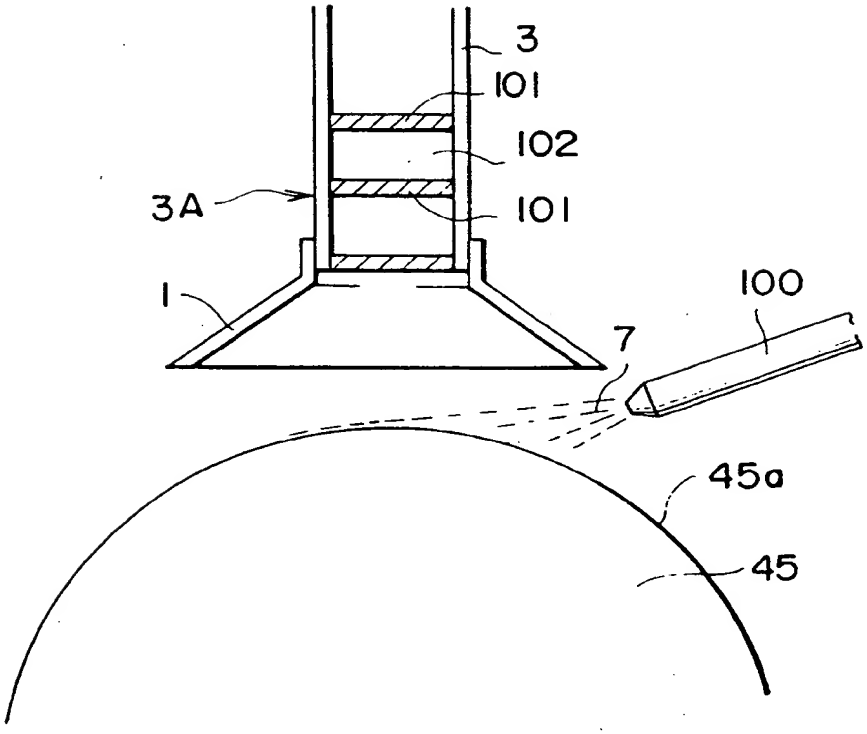


FIG. 35

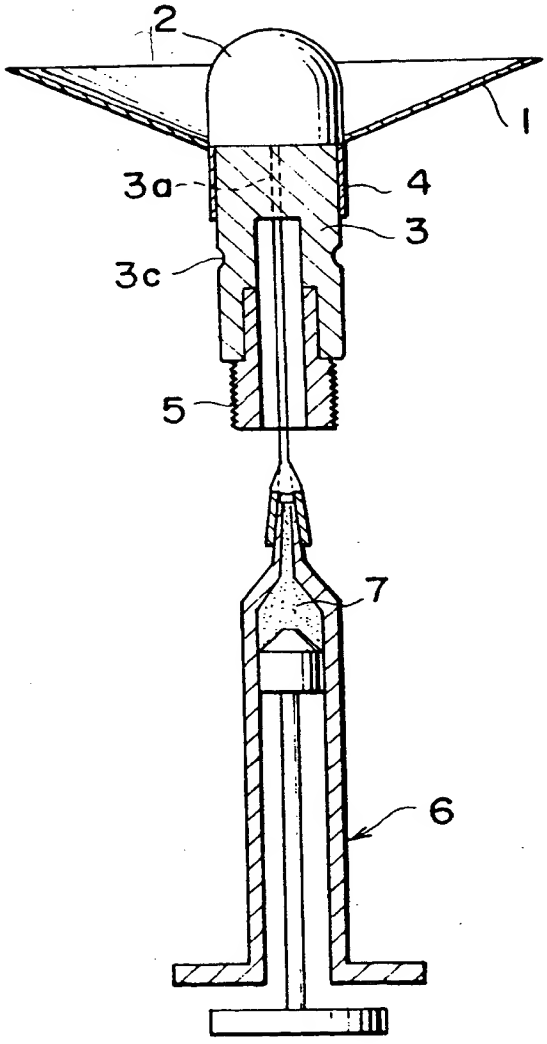


FIG. 36

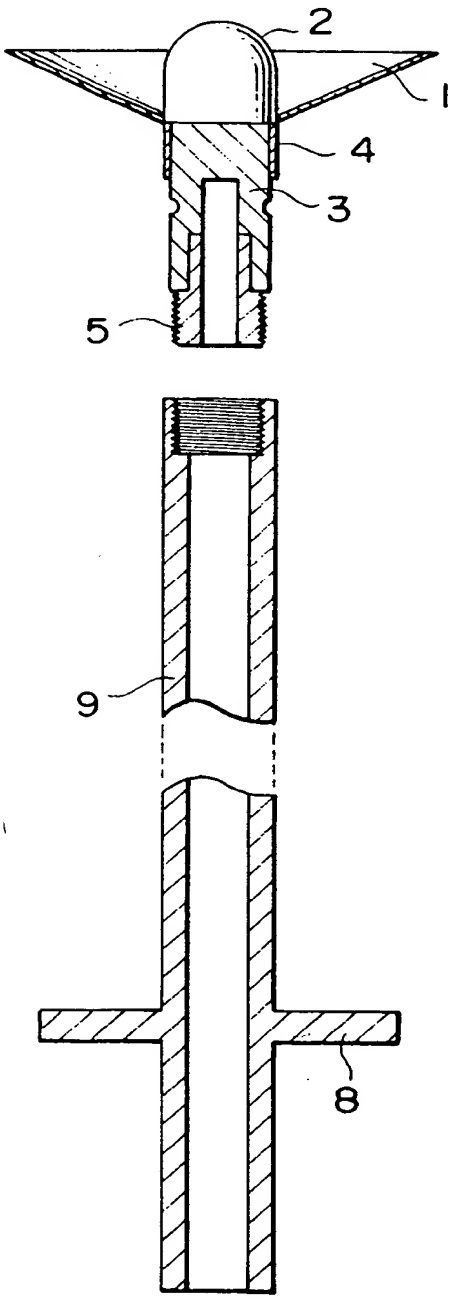


FIG. 37

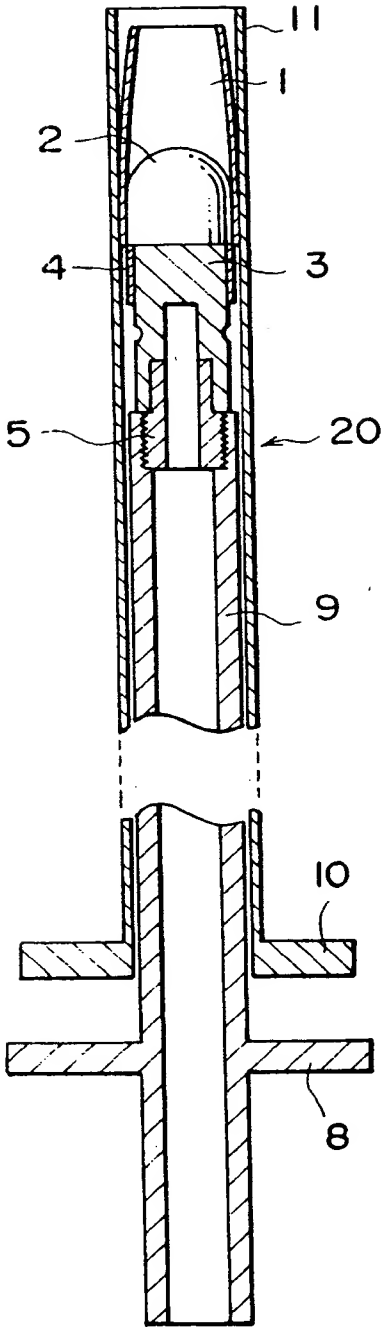
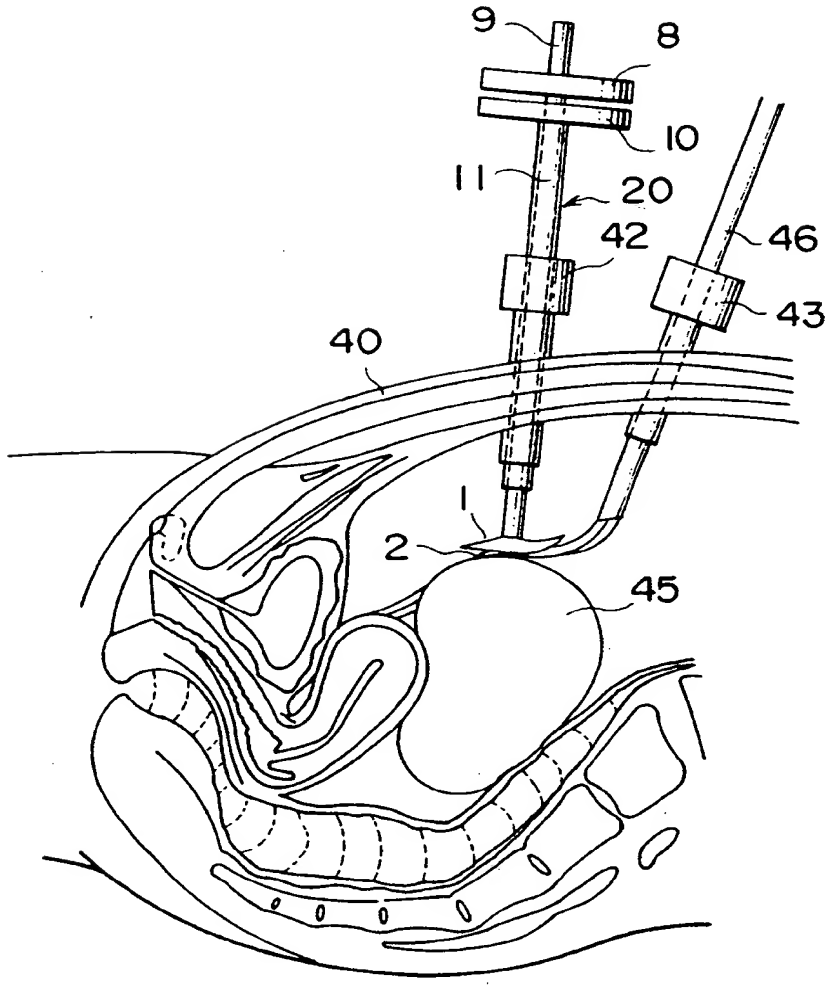


FIG. 38



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PARTIAL EUROPEAN SEARCH REPORT

which under Rule 45 of the European Patent Convention shall be considered, for the purposes of subsequent proceedings, as the European search report

Application number

EP 95309139.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl6)
X	WO - A - 85/00 009 (M. WIEGERINCK) * Fig. 1-5; page 1, lines 4-11,22-25; page 2, lines 17-23; page 3, lines 26-30; page 4, line 5 - page 5, line 15 *	10	A 61 B 10/00 A 61 B 17/34
A	--	15	
A	EP - A - 0 113 520 (VANCE PROD.) * Fig. 1; page 6, line 23 - page 7, line 5; claim 7 *	10	
A	--	10,15	
A	US - A - 4 693 257 (CH. MARKHAM) * Totality *		
A	--	15	
P,X	EP - A - 0 186 256 (HAKKO EL. MACH.) * Fig. 5-8; page 6, lines 11-21; claims 1,2 *	10,11,	
	--		TECHNICAL FIELDS SEARCHED (Int Cl6)
	JP - A - 07 313 513		A 61 B A 61 M

INCOMPLETE SEARCH

The Search Division considers that the present European patent application does not comply with the provisions of the European Patent Convention to such an extent that it is not possible to carry out a meaningful search into the state of the art on the basis of some of the claims.

Claims searched completely: 10-16

Claims searched incompletely:

Claims not searched: 1-9 according to Art. 52(4) EPC

Reason for the limitation of the search: -

Place of search	Date of completion of the search	Examiner
VIENNA	03-10-1996	LUDWIG

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D : document cited in the application
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& : member of the same patent family, corresponding document

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Application number
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EP 95309139.4

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.6)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	(SASAKI) * Fig. 1-32 *; & DATABASE WPIL, AN 96-053 971(6), DERWENT PUBLICATIONS LTD., London; * Abstract * ----	13,15	
			TECHNICAL FIELDS SEARCHED (Int. Cl.6)

EPO Form 1505.3 06.78